

DRIP IRRIGATION OF SEED ONIONS IN CENTRAL OREGON:
PRELIMINARY DATA ON THE EFFECT OF TAPE PLACEMENT

Peter Sexton, Claudia Campbell, Fred Crowe, and Clint Shock.

Introduction

Scape blight disease caused by the fungus *Botrytis allii* can be a serious problem in onion seed production, sometimes causing complete stand loss. Drip irrigation may have potential to decrease disease pressure while also decreasing water and fertilizer requirements. While there is some information published on drip irrigation of bulb onions, information for drip irrigation of seed onions is scarce. The objective of this experiment was to observe the effect of drip tape placement on disease incidence and yield of seed onion. Placing tape deeper in the soil may decrease soil moisture at the soil surface and so decrease the potential for infection of the shoots, but on the other hand if the tape is too deep it might not feed the roots of the plants efficiently. This is a work in progress, so only a brief preliminary report will be given here.

Materials and Methods

Hybrid seed onions were planted in 2 ft. rows on July 30, 1999. Two rows of female lines were alternated with two rows of male lines. Plots consisted of four rows (inner two rows female and outer two rows male). Treatments consisted of drip tape (Rainbird, R-095132-65-25, delivers 0.25 gal/min/100 ft.) shanked in at depths of 8, 4, and 2 inches before planting, along with a surface placement after planting. The trial was laid out as a randomized complete block design with four replications. All plots were sprinkled up using a solid set sprinkler system. After emergence, the irrigation pipe was removed and the plots were irrigated on an 8-hour set whenever average soil water potential was greater than -45 kPa within a given replicate (all plots within a replicate were watered together whenever the replicate average was within 10 percent of the -45 kPa). Soil water potential was tracked using granular matrix sensors (one per plot, placed in the row 6 inches deep) measured three times weekly and averaged across plots for each replication to guide irrigation. A parallel plot of sprinkle irrigated onions was maintained to provide a preliminary comparison of yield under drip versus sprinkle irrigation. Weeds were controlled by a combination of herbicides and hand weeding.

Seed yield was determined by hand harvesting 20 ft. of row from the female plots on August 25, 2000. Seed heads were placed in burlap bags, allowed to air dry, and threshed in a stationary thresher. The seed was cleaned and purity analysis conducted to provide an estimate of seed yield. Sprinkle versus drip yields were compared by averaging the values for each replicate from the drip plot, and comparing these values to those of parallel sprinkle irrigated plots using a t-test.

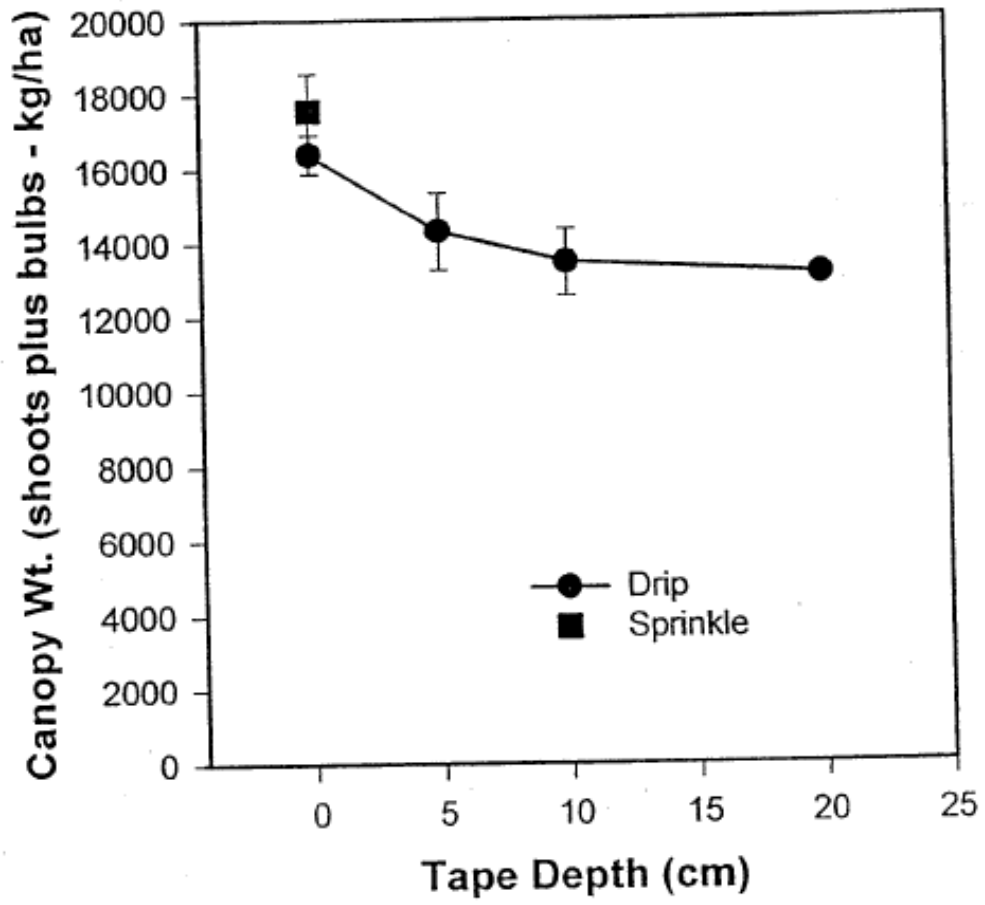
Results and Discussion

Disease incidence was not severe in this season, and there were no statistically significant differences between drip and sprinkle irrigated plots in *Botrytis* incidence (Table 1). Drip plots tended to have less weed growth than did sprinkle plots. Weeds were controlled by hand-weeding after the measurements of weed number and biomass were taken. Weed control was effective as total plant biomass at flowering of the onion crop tended to be greater in the sprinkle than in the drip plots (Fig. 1). Biomass tended to decrease as tape depth increased (Fig. 1). The drip plots developed some N and K deficiencies in June, which were corrected with application of nutrients through the drip system. The drip plots developed symptoms of basal rot in June, so irrigation time was decreased from 8 to 4 hours/set.

Seed yield was greater in the drip plots than in the sprinkle plots (Table 1 and Fig. 2). Within the drip plots there was a trend for seed yield to be greatest at a tape depth of 4 inches. There were no differences in number of umbels per acre between the various treatments (data not shown), nor were there differences in weight per seed (Fig. 2). Thus it appears that differences in seed yield were primarily a function of seed set, with the number of seeds per umbel being greatest at a tape depth of 4 inches, and least in the sprinkle plots.

Table 1. Average yield, disease, and weed incidence in side-by-side drip and sprinkle irrigated seed onions. Means were compared using a paired t-test.

Variable	Drip value	Sprinkle value	Probability > N
Seed yield (kg/ha.)	805	291	0.009
Seeds per umbel	195	72	0.007
<i>Botrytis</i> -- lower plant	36.4	22.2	0.102
<i>Botrytis</i> -- upper plant	4.3	6.8	0.125
Weed dry mass (kg/ha.)	37	286	0.062



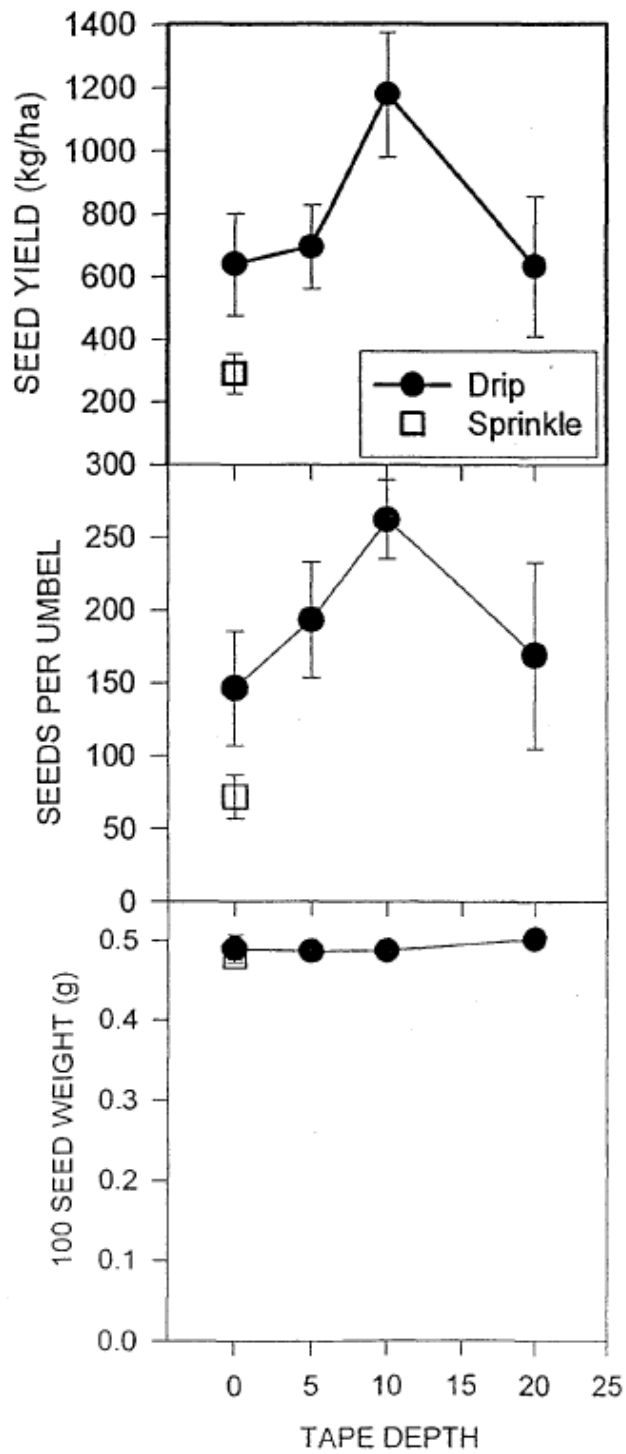


Figure 2. Seed yield, seeds per umbel, and weight per seed for hybrid seed onions grown under drip irrigation with tape depth varying from 0 to 8 inches. Data for sprinkle plots are from a parallel set of plots.